TRIP REPORT ON THE OUTBREAK OF THE PINE PROCESSIONARY CATERPILLAR, *THAUMETOPOEA PITYOCAMPA*, IN CYPRUS

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The Insect

The pine processionary caterpillar (*Thaumetopoea pityocampa*) is a native to the Mediterranean region of southern Europe, North Africa and the Near East, where it feeds on various species of *Pinus* and *Cedrus*. In Cyprus, *Pinus brutia* is the favorite host and suffers severe damage. *Pinus nigra* and the endemic *Cedrus libani ssp. brevifolia* receive only minor damage. Egg masses are laid on pine needles in late summer-early fall and the larvae occur in large colonies in the crowns of host trees between September and March. During the winter, the larvae remain dormant in large silken webs constructed in tree crowns. During spring, the larvae migrate in long processions from tree crowns to pupate in the soil. Adults emerge in late summer to lay eggs. A portion of the pupae may remain in the soil for up to five years before they emerge as adults.

Figure 1. Late instar T. pityocampa on nest.

Impact.

Effects of *T. Pityocampa* outbreaks include severe skin and eye irritation in humans due to exposure to the urtricating hairs of the mature larvae. Effects on forests include growth reduction, stem deformity, and tree mortality. In some locations, the occurrence of outbreaks is cyclic and relatively predictable whereas in other areas outbreaks may be sporadic or populations may remain at damaging levels more or less continuously.

Figure 2. Damage to Pinus brutia by T. pityocampa.

TRAINING SESSION

Training was held in the UN zone in Nicosia, separating the Greek (GCC) and Turkish (TCC) Cypriot Communities. This joint workshop was the first official meeting by any government agency, for both Cypriot governments. A total of approximately 60 foresters and researchers from both communities attended the two day IPM training session.

My portion of the training session consisted of three presentations:

1. Spray dynamics and pest interaction
2. Calibration and Characterization of spray aircraft
3. Nontarget effects of Btk

A list of attendees and text of all the presentations are include in the workshop proceedings produced by Bill Ciesla for the UNSOP.

FIELD TRIP

Following the training session, a select component of the trainees participated in field trips to each side of the island. These field trips focused on the insect pest problems, development of an insect population sampling plan (Figure 3.) and current forestry practices.

Figure 3. Field trip and instruction in development of pine processionary moth hazard rating system in northern Cyprus.

ITEMS FOR CONSIDERATION

In discussions with some of the pest management professionals and from questions raised during the training session, the following are areas where additional training and assistance would be beneficial.

IMPROVEMENTS IN AERIAL APPLICATION

Forest aerial application has occurred only on that portion of Cyprus occupied by the GCC. Previously, both *Bacillus thuringiensis* var *kurstaki* (Btk) and diflubenzuron have been used to control infestations of *T. pityocampa*. Currently, only Btk is being considered for forest applications.

Figure 4. Older model Micronair AU-3000 on GCC Piper Pawnee

The Department of Agriculture of the GCC has made two small single engine Piper Pawnee aircraft available to the Department of Forestry. One aircraft is fitted with four older model Micronair AU-3000 (Figure 4) rotary atomizers. The aircraft were originally purchased for control of insects in olive groves but are no longer used because aerial application of chemicals over agricultural crops is no longer permitted. The application aircraft is some what underpowered for the type of mountainous terrain that is being treated. This results in higher insecticide release heights, which in turns reduces

the deposition to the target forest and program effectiveness.

The effective use of Btk to control forest defoliators involves the interaction of many factors including, the spray system, the number and size of droplets released, the life stage of the target insect, and environmental conditions at the time of application.

For Btk, the current trend in the US is to apply higher doses Btk formulations (e.g. Foray 76B) at lower undiluted volume rates (2-3 liters/ha) for a single application. In Macedonia in 2002 for the control of pine processionary caterpillar we used 2 and 3 liter undiluted rates of Foray 48B, with 95 and 98 percent control, respectively. Timing of application was made to coincide with peak 2nd instar larvae. Current application rate of diluted Btk by the GCC are much greater. The application of diluted product is more costly, and probably is less effective.

In talking with pest managers the primary reason for diluting the product is that the aircraft spray system has problems delivering undiluted Btk (Foray 48B). In order to apply the material, the Btk formulation has been diluted with 2 liters water to 1 liter Foray. As undiluted Foray 48B is within 7% the viscosity of water, this would indicate a problem within the spray system rather than with the product. Besides reducing aircraft production rates thereby adding additional costs to the program, diluting the product reduces its formulated adhesion properties and reduces the toxicity of the droplet.

I accompanied Dr. Robert Fusco from Valient BioSciences (manufacturer Foray) to inspect the application aircraft. The pilot was unfamiliar with the setup and settings of the Micronair AU-3000 rotary atomizers. These spray units are no longer in production and had been originally purchased when the aircraft was used in agricultural spraying,. The knowledge about their uses and setup left with the previous pilot(s). On inspection of the atomizers, the blade angles used to determine droplet sizes varied both within and between units. The VRU settings were also inconsistant, but mayhave been set to regulate total flow.

Even with their prior problems we repeated our recommendation that they apply Foray undiluted. To accomplish this they will need assistance in the proper setup and calibration of the current application equipment.

For insecticides that must be ingested to be effective, small 80 to 100 micron droplets are desirable in order to increase the collection efficiency of pine needles and thereby increase the insect's probability of encounter with a toxic dose. For the aircraft currently used, characterization trials have not been conducted and the spray droplet spectrum is not known. The swath width used by the aircraft was unrealistically low, only one meter larger than the aircraft's wingspan. From previous work with aircraft, I feel we could effectively double the current swath width. This would increase the aircraft's production rate, reduce spray system flow rates, and possibly alleviate problems in the spray system so undiluted Foray could be used.

Assistance in proper spray system calibration and setup would reduceprogram cost, increase production rates, and increase the biological effectiveness of the aerial application.